

## REMARKS

### **1. Amendments**

Claim 1 is amended to change the transitional term used to define the catalyst composition. Upon a further review of the cited prior art Applicant believes, as discussed hereinbelow, that there is no need to use a partially closed transition in defining the catalyst composition.

Claim 13 is amended in response to the Examiner's objection. The Examiner's objection should thereby be rendered moot.

New claim 26 is added. This claim recites an additional limitation to the catalyst composition that it is to be free of a Group VIB metal. Support for this limitation is found in the specification at page 13, lines 29-33.

### **2. § 103 Rejection of Claims 1, 3-11, and 13-15 Over WO 98/01515 to Moureaux**

The Examiner has rejected claims 1, 3-11, and 13-15 under 35 U.S.C. 103(a) as being obvious over WO 98/01515 to Moureaux. This rejection is respectfully traversed.

The Moureaux publication discloses a process for the preparation of lubricating base oils that necessarily includes two reaction stages with an intermediate separation step between the two reaction stages. *See* Abstract; page 1, lines 2-8; page 5, lines 7-25; page 9, lines 30-32; page 10, line 31-page 11, line 18; page 17, line 31-page 18, line 4; claim 1; and Figures 1 and 2. The first reaction stage is a hydrotreating step used to remove sulfur and nitrogen from a hydrocarbon feed using a catalyst comprising both a Group VIB metal component and a non-noble Group VIII metal component supported on a refractory oxide carrier. *See* page 5, lines 10-14; page 6, line 14-page 7, line 20. The importance of the sulfur and nitrogen removal reaction step is emphasized. *See* page 9, line 1-page 10, line 3. It is noted that the noble-metal based catalyst used in the second reaction step is sensitive to poisoning by sulfur and nitrogen. *See* page 9, lines 9-15.

The product from the first reaction step is to be separated into a gaseous fraction and a liquid fraction. *See* page 9, lines 30-32. The first reaction step is to be operated so as to provide the liquid fraction having less than 1000 ppmw sulfur and less than 50 ppmw nitrogen. *See* page

9, lines 1-7; page 9, line 32-page 10, line 3. But, it is preferred for these concentrations to be lower such as less than 500 ppmw sulfur and less than 30 ppmw nitrogen. *Ibid.*

The second reaction stage may provide the two functions of hydrofinishing (hydrogenation of aromatics) and hydrodewaxing (hydroisomerization), or a single function of hydrofinishing alone, configured in a variety of ways. *See* page 10, line 31-page 11, line 33. In the case where the second reaction stage provides for the two functions, the hydrodewaxing function precedes the hydrofinishing function. *See* page 11, lines 22-29; page 14, line 4-page 16, line 5. Thus, in accordance with the invention, the liquid fraction undergoes a catalytic hydrofinishing treatment after a catalytic hydrodewaxing treatment, but the catalytic hydrofinishing treatment may be conducted when there is no prior catalytic hydrodewaxing treatment.

The hydrofinishing catalyst comprises a noble metal component, such as platinum and palladium, supported on an amorphous refractory oxide carrier. *See* page 12, line 1-page 13, line 3. It is important for the carrier to be an amorphous refractory oxide, with it being understood that the refractory oxides exclude those of zeolitic nature, such as aluminosilicates and silica-aluminophosphates. *See* page 12, lines 21-25.

The dewaxing catalyst may be selected from those known in the art, such as, dewaxing catalysts comprising a noble metal (platinum or palladium) supported on an intermediate pore size zeolitic material. *See* page 14, lines 13-27. Another class of dewaxing catalyst comprises a noble metal component supported on a surface deactivated aluminosilicate. *See* page 14, lines 27-31.

The Examiner discusses the disclosure of the Moureaux publication concerning the dewaxing of a hydrocarbon that has a low sulfur concentration by using a noble metal catalyst, but he does not point to the overall teachings of the Moureaux publication of a two reaction stage process for the preparation of a lubricating base oil. The second reaction step of the process taught by the Moureaux publication must include a hydrofinishing treatment and may include a hydrodewaxing treatment, which if present in the described two-stage process, precedes the hydrofinishing treatment. Contrary to the Examiner's statement, the hydrotreatment step of the Moureaux process is performed prior to the hydrofinishing of the desulfurized liquid fraction, or prior to the hydrodewaxing and hydrofinishing of the desulfurized liquid fraction.

The Examiner concedes that the Moureaux publication fails to disclose the particular feeds recited in Applicant's claimed invention, but he dismisses this difference by assuming, without citing any authority or reference to support his assumptions, that the feeds are physically and chemically similar to those disclosed by Moureaux. He then concludes that, because of these similarities, the Moureaux process could effectively process the feeds recited by the Applicant.

Applicant respectfully challenges the Examiner's assertion that the recited feeds are physically and chemically similar, and, moreover, asserts that the feeds to the dewaxing treatment section of the two processes are certainly different for each process due to the differences in the processing of the starting feedstocks prior to the dewaxing treatment.

Both the Moureaux publication and the Examiner note that the presence of a high concentration of sulfur in a feed contacted with a dewaxing catalyst can cause poisoning of the catalyst. The feeds in the two processes have different concentration levels of sulfur, which provides a chemical difference. A solvent extracted waxy raffinate is also different from a hydrotreated heavy oil fraction, and feedstocks, such as hydrocracker feed and gas oil, are certainly different from a hydrotreated heavy oil fraction. Applicant fails to see the asserted chemical and physical similarities. The feeds have different boiling ranges, thus, different molecular weights, they have different concentrations of sulfur and nitrogen, and they have different concentrations of aromatics as well as other differences.

The Examiner notes that sulfur is a known poison to noble metal catalysts and that the Moureaux publication teaches the need for its feedstock that is to be catalytically dewaxed to have a concentration of sulfur that is less than 1000 ppmw. But, he argues that it is obvious to one skilled in the art to modify the Moureaux process to utilize a feed that has a concentration of sulfur that is slightly more than 1000 ppmw. He asserts this argument in spite of the Moureaux teachings that it is best for the sulfur concentration to be a low concentration, preferably less than 500 ppmw. The Moureaux teachings that the sulfur concentration should be less than 1000 ppmw, but, preferably, less than 500 ppmw, would not lead one skilled in the art to use a feed to a catalytic dewaxing step having a sulfur concentration that is higher than 1000 ppmw.

Moreover, the focus of the Examiner exclusively on the sulfur concentration ignores one of the important features of Applicant's invention, which is that there is no requirement, as in the Moureaux process, to hydrotreat the feed that undergoes catalytic dewaxing. The Moureaux

process requires the hydrotreatment of the hydrocarbon oil feed prior to the separation and hydrofinishing treatment of the liquid fraction of the hydrotreated effluent.

The Examiner argues that, because Moreaux discloses the need in its process for solvent dewaxing when hydrofinishing is used in the second stage but therein catalytic dewaxing is not used, it is obvious to one skilled in the art to modify the process of Moreaux by replacing the solvent dewaxing step with the catalytic dewaxing step; allegedly, because, they have equivalent function.

It seems that the aforescribed reasoning is circular, but even if one could apply such reasoning, the suggested modification would not result in Applicant's inventive process. The Moreaux process requires a hydrotreatment stage and a separation step both prior to the second reaction stage, which can include a catalytic dewaxing function that is followed by a hydrofinishing function. On the other hand, Applicant's process does not include a hydrotreating step. In fact, the exclusion of the hydrotreating step is one of the benefits of Applicant's invention.

Considering the above noted differences between Applicant's claimed invention and the disclosures and teachings of the Moreaux publication, it is respectfully asserted that Applicant's claimed invention is patentable over the Moreaux publication. Thus, Applicant respectfully requests the reconsideration and withdrawal of the Examiner's rejection and the allowance of claims 1, 3-11, and 13-15.

**3. § 103 Rejection of Claim 12 Over WO 98/01515 to Moureaux in view of Ward (U.S. 4,743,354)**

The Examiner has rejected claim 12 under 35 U.S.C. 103(a) as being obvious over WO 98/01515 to Moureaux in view of the Ward patent (U. S. 4,743,354). This rejection is respectfully traversed.

A summary of the relevant Moureaux teachings is presented above.

The Ward patent is directed to a process for converting a waxy hydrocarbon feedstock. The process includes a dewaxing step followed by a hydrocracking step. *See* Abstract; column 3, lines 1-9; column 8, lines 28-39; and claims. The preferred feedstock for producing the lube oil base is a full range shale oil or shale oil fraction that has been catalytically hydrotreated. *See* column 4, lines 22-25. A preferred embodiment of the Ward process requires the entire effluent from the hydrodewaxing reactor to be passed to a hydrocracker reactor. *See* column 8, lines 28-39.

The Examiner argues that the recitation in claim 12 of an intermediate hydrotreating step followed by a hydrocracking step is not sufficient to distinguish claim 12 over the Moureaux publication. The Examiner asserts that the Moureaux publication discloses a hydrotreating step subsequent to the dewaxing step. Applicant, however, respectfully disagrees with the Examiner on this assertion in that the portion of the Moureaux publication to which he points to support his position actually teaches nothing about hydrotreating. Instead, the text teaches the use of two separate catalyst beds within a single reactor with the upper bed comprising a dewaxing catalyst and the lower bed comprising a hydrofinishing catalyst. As summarized above, the Moureaux publication discloses a two-stage process with the first stage being a hydrotreatment stage followed by a separation and thereafter a second stage that can include two functions of hydrofinishing and dewaxing. *See* page 10, line 31 – page 11, line 34.

There would be no motivation to combine the Ward patent with the Moureaux publication since the Moureaux process hydrotreats its starting feed material before the subsequent dewaxing or hydrofinishing, and the Ward patent teaches only the hydrocracking of a dewaxed feedstock and not the hydrotreating of a dewaxed feedstock.

Considering the differences as noted above with respect to the Ward patent and with respect to the Moureaux publication, it is respectfully asserted that Applicant's invention of claim 12 is patentable over the cited references. Thus, Applicant respectfully requests the reconsideration and withdrawal of the Examiner's rejection and the allowance of claim 12.

**4. § 103 Rejection of Claim 16 Over WO 98/01515 to Moureaux in view of Abdo et al. (U.S. 4,867,861)**

The Examiner has rejected claim 16 under 35 U.S.C. 103(a) as being obvious over WO 98/01515 to Moureaux in view of the Abdo et al. patent (U. S. 4,867,861). This rejection is respectfully traversed.

A summary of the relevant Moureaux teachings is presented above.

Abdo et al. disclose a dewaxing process that utilizes a dewaxing catalyst comprising both an intermediate pore crystalline molecular sieve and a large pore crystalline molecular sieve. *See* column 2, lines 51-63; column 4, lines 55-61; and claims. The claimed catalyst of the Abdo et al patent excludes hydrogenation metal components, *see* claims, but, the specification indicates that a hydrogenation component may be present in the dewaxing catalyst. *See* column 3, lines 27-30;

and column 11, lines 34-41. The hydrogenation component may include a Group VIII metal component such as platinum, palladium, cobalt, and nickel. *See* column 11, lines 34-41. The catalyst may also include a Group VIB metal component. *See* column 11, lines 40-44.

The Examiner argues that it is obvious to modify the Moureaux dewaxing catalyst to utilize a nickel component; because, Abdo et al disclose the use of a nickel component in its dewaxing catalyst, and the Examiner says this substitution may be made because the function of the nickel is equivalent to the function of the noble metal of the Moureaux dewaxing catalyst.

Applicant respectfully disagrees with the Examiner concerning the application of the Abdo et al patent. The Examiner has pointed to no authority or reference to support the conclusion that a nickel component would have equivalent function to a noble metal component of the Moureaux catalyst. It is common knowledge among those skilled in the art of catalysis that Group VIII noble metals have different catalytic properties than non-noble Group VIII metals. The catalyst of the Abdo et al patent is significantly different from the Moureaux catalyst. Abdo et al require their catalyst to include two different types of molecular sieves; but, on the other hand, Moureaux indicates that his catalyst is based on an intermediate pore size zeolitic material and a noble Group VIII metal component. *See* Moureaux at page 14, lines 13-31. The catalyst may also include a noble Group VIII metal component supported on a surface deactivated aluminosilicate. *See id.*

In addition to the differences between the Moureaux and Abdo et al catalysts, the Examiner's entire analysis ignores that Applicant's inventive process relates to the dewaxing of a feedstock that has a high sulfur concentration. The references relied upon by the Examiner involve the catalytic dewaxing treatment of a hydrotreated feedstock, but Applicant's inventive process does not require its feedstock to be hydrotreated. The processing of a high sulfur content feed is an important feature of the inventive process. The cited references themselves teach against the dewaxing treatment of a non-hydrotreated feed.

Considering the differences as noted above with respect to the Abdo et al patent and with respect to the Moureaux publication, it is respectfully asserted that Applicant's invention of claim 16 is patentable over the cited references. Thus, Applicant respectfully requests the reconsideration and withdrawal of the Examiner's rejection and the allowance of claim 16.

**5. § 103 Rejection of Claims 17-25 Over WO 98/01515 to Moureaux in view of Abdo et al. (U.S. 4,867,861)**

The Examiner has rejected claims 17-25 under 35 U.S.C. 103(a) as being obvious over WO 98/01515 to Moureaux in view of the Abdo et al. patent (U. S. 4,867,861). This rejection is respectfully traversed.

A summary of the relevant Moureaux teachings is presented above.

A summary of the relevant Abdo et al teachings is presented above.

The Examiner applies the Abdo et al patent in the same manner as applied above with respect to claim 16 to supply the nickel component that is not disclosed by the Moureaux publication to be a component of its catalyst. The Examiner also applies the Moureaux publication in the same manner as above with respect to claims 1, 3-11, and 13-15. The distinctions are the same as those discussed above with respect to the Examiner's rejection of claims 1, 3-11, and 13-15 over Moureaux.

It is respectfully asserted that claims 17-25 are patentably distinguishable over the cited prior art. Reconsideration and withdrawal of the Examiner's rejection and allowance of claims 17-15 are, thus, respectfully requested.

**6. New Claim 26**

New claim 26 has been added to the specification. The limitation requiring the catalyst to have an absence of a Group VIB metal provides further differences over the cited prior art. It is therefore asserted that claim 26 is patentable over the art.

**7. Conclusion**

In view of the above remarks, Applicant respectfully asserts that the claims now pending in the application are in a condition for allowance.

Respectfully submitted,

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